UNITED STATES PATENT AND TRADEMARK OFFICE

NOTICE OF ALLOWANCE AND FEE(S) DUE

| 27305 | 7590 | 05/12/2009 |

HOWARD & HOWARD ATTORNEYS PLLC
450 West Fourth Street
Royal Oak, MI 48067

EXAMINER
CHOU, ALBERT T

ART UNIT	PAPER NUMBER
2416	

DATE MAILED: 05/12/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,815	06/14/2006	Chang-Jun Ahn	060233.00032	8670

TITLE OF INVENTION: TRANSMITTER, RECEIVER, TRANSMITTING METHOD, RECEIVING METHOD, AND PROGRAM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$755	$300	$0	$1055	08/12/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u>

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

or <u>Fax</u> **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27305	7590	05/12/2009

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Royal Oak, MI 48067

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)

_____ (Signature)

_____ (Date)

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nonprovisional	YES	$755	$300	$0	$1055	08/12/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHOU, ALBERT T	2416	370-208000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.   OMB 0651-0033   U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
CHOU, ALBERT T

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DATE MAILED: 05/12/2009

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 514 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 514 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101   or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

	Application No.	Applicant(s)	
Notice of Allowability	10/582,815	AHN, CHANG-JUN	
	Examiner	Art Unit	
	ALBERT T. CHOU	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the amendment filed on 7 April 2009*.

2. ☒ The allowed claim(s) is/are *1-16*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the

          International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

        Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☐ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

EXAMINER'S AMENDMENT

1.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

        Authorization for this examiner's amendment was given in a telephone interview

with Mr. Michael G. Shariff on May 6, 2009.

        The application has been amended as follows:

  •   Claims 5, 6 and 12-16 have been amended as shown in the ATTACHMENT

        (6 pages)

Allowable Subject Matter

2.   Claims 1-16 are allowed.

3.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert T. Chou whose telephone number is 571-272-6045. The examiner can normally be reached on 8:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi H. Pham, can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Albert T Chou/

Examiner, Art Unit 2416

May 6, 2009

ATTACHMENT

5.   (Currently Amended) An information storage medium having stored thereon a

program, when executed by a computer, for controlling said computer to function a

coding section, a serial-to-parallel conversion section, a unitary matrix modulation

section, a split section, an inverse Fourier transform section, and a transmitting section,

   said program controls said computer,

   to receive an input of a transmitting signal and low-density-parity-codes the received signal,

and output the coded signal;

   to convert the output coded signal from serial to parallel, and output m (m>=2) intermediate

signals;

   to modulate the output m intermediate signals to a unitary matrix of m rows and m columns

where elements excepting diagonal elements are zero, and output an obtained matrix;

   to supply each of the diagonal elements of the output matrix to each input channel

of the inverse Fourier transform, as an input signal;

   to inversely Fourier transform the input signals supplied to the input channels, and

output obtained m inversely Fourier transformed signals;

   to convert the output m inversely Fourier transformed signals from parallel to serial,

and output one transmission signal;

   to transmit the output transmission signal; and

   any of frequency differences between the channels of the inverse Fourier transform,

is a predetermined coherent bandwidth or more.

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6.   (Currently Amended)   An information storage medium having stored thereon

a program, when executed by a computer, for controlling said computer to function a

receiving section, a serial-to-parallel conversion section, a Fourier transform section, an

inverse split section, a unitary matrix demodulation section, a parallel-to-serial

conversion section, and a decoding section,

said program controls said computer:

to receive a transmitted transmission signal and output the signal as a received

signal;

to receive the output received signal from serial to parallel, and output m (m>=2)

intermediate signals;

to Fourier transform the output m intermediate signals, and output obtained m Fourier

transformed signals;

to supply the output m Fourier transformed signals to the unitary matrix demodulation

section;

to demodulate, from matrixes of m rows and m columns where each of the supplied m

Fourier transformed signals is a diagonal element and elements excepting the diagonal elements

are zero, the signals associated with the unitary matrixes of m rows and m columns where

elements excepting diagonal elements are zero, and output the signals as demodulated signals;

to convert the plurality of modulated signals from parallel to serial, and output the signal as a

serialized signal;

to low-density-parity-code the output serialized signal, and output the signal as a transmitted

signal; and

any of frequency differences between channels of the Fourier transform, is a

predetermined coherent bandwidth or more.

12.   (Currently Amended) An information storage medium having stored thereon a

program, when executed by a computer, for controlling said computer to function a

coding section, a serial-to-parallel conversion section, a plurality of unitary matrix

modulation sections, a split section, an inverse Fourier transform section, a parallel-to-

serial conversion section, and a transmitting section,

said program controls said computer:

to receive an input of a transmitting signal and low-density-parity-codes the received signal,

and output the coded signal;

to receive an input of the output coded signal and convert the signal from serial to parallel,

and output m x n (m>=2, n>=1) intermediate signals;

to each modulate the output any m of intermediate signals of the output m x n (m>=2, n>=1)

intermediate signals without overlaps to a unitary matrix of m rows and m columns where

elements excepting diagonal elements are zero, and output an obtained matrix;

to supply each of the diagonal elements of the output matrix to each input channel

of the inverse Fourier transform, as an input signal;

to inversely Fourier transform the input signals supplied to the input channels, and

output obtained m inversely Fourier transformed signals;

to convert the output m inversely Fourier transformed signals from parallel to serial,

and output one transmission signal;

to transmit the output transmission signal; and

any of frequency differences between the channels to which the diagonal elements of

the matrix are given from the plurality of unitary matrix modulations is a predetermined

coherent bandwidth or more, among the channels of the inverse Fourier transform.

13.   (Currently Amended)   The information storage medium having stored

thereon said program according to claim 12, wherein said program controls said

computer to function in such a way that the diagonal elements (0<=i<n, 0<=j<m) of j-th

row and j-th column of a matrix output from an ith unitary matrix modulation are given to

a j×m+i-th input channel of the inverse Fourier transform, among the plurality of unitary

matrix modulations.

14.   (Currently Amended)   An information storage medium having stored thereon

a program, when executed by a computer, for controlling said computer to function a

receiving section, a serial-to-parallel conversion section, a Fourier transform section, an

inverse split section, a plurality of unitary matrix demodulation sections, a parallel-to-

serial conversion section, and a decoding section,

said program controls said computer:

to receive a transmitted transmission signal and output the signal as a received

signal;

to convert the output received signal from serial to parallel, and output m x n (m>=2, n>=1)

intermediate signals;

to Fourier transform the output m x n intermediate signals, and output obtained m x n Fourier

transformed signals;

to supply the output m x n Fourier transformed signals to each of the unitary matrix

demodulation sections by n without overlaps;

to each demodulate, from matrixes of m rows and m columns where each of the supplied m

Fourier transformed signals is a diagonal element and elements excepting the diagonal elements

are zero, the signals associated with the unitary matrixes of m rows and m columns where

elements excepting diagonal elements are zero, and output the signals as demodulated signals;

to convert the plurality of modulated signals from parallel to serial, and output the signal as a

transmitted signal;

to low-density-parity-code the output serialized signal, and output the signal as a transmitted

signal; and

any of frequency differences between the channels, each from which the Fourier

transformed signal given to each of the plurality of unitary matrix modulations is output,

is a predetermined coherent bandwidth or more, among the channels of the Fourier

transform.

15.   (Currently Amended)   The information storage medium having stored

thereon said program according to claim 14, wherein said program controls said

computer to function in such a way that each of the plurality of unitary matrix

demodulations compares each of predetermined plurality of unitary matrixes, which are

unitary matrixes of m rows and m columns where elements excepting the diagonal

elements are zero, with each of the matrixes of m rows and m columns where each of the

supplied m Fourier transformed signals is a diagonal element and elements excepting the

diagonal elements are zero, selects a matrix having a minimum Euclidean distance among

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from the predetermined plurality of unitary matrixes, and sets the selected matrix as a

demodulation result.

16.   (Currently Amended)   The information storage medium having stored

thereon said program according to claim 15, wherein said program controls said

computer to function in such a way that the diagonal elements (0<=i<n, 0<=j<m) of j-th

row and j-th column of a matrix compared by an ith unitary matrix demodulation are

output from a j×m+i-th output channel of the inverse Fourier transform, among the

plurality of unitary matrix demodulations.

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